Youth Alcohol Brand Consumption and Exposure to Brand Advertising in Magazines

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ABSTRACT. Objective: Recently published research has identified the alcohol brands most frequently consumed by underage youth. The present study examines alcohol magazine advertising in 2011 to report age- and sex-specific exposure to advertisements for these brands in contrast with other magazine advertising brands less popular with youth. **Method:** We licensed magazine advertising occurrence data from Nielsen and magazine audience data from the research company GfK MRI (Growth from Knowledge, Mediamark Research & Intelligence) for national full-run editions for 2011. We contrasted per capita advertising exposure, considering different age- and sex-specific groups, for popular youth brands versus all other magazine brands. For each brand, we reported the age group receiving the highest level of per capita advertising exposure, as well as other age groups within 10% of that

peak level. **Results:** Underage males ages 18–20 were the most heavily exposed age group for 11 of the top 25 brands they consumed and were within 10% of the most heavily exposed group for another 6 brands. Underage females ages 18–20 were most heavily exposed for 16 of the top 25 brands they consumed and were within 10% of the most heavily exposed group for another 2 brands. In contrast, those ages 18–20 were the most heavily exposed group for fewer than 10% of the remaining 308 magazine advertising brands for either sex. **Conclusions:** These findings suggest a relationship between advertising exposure and youth alcohol brand consumption. Current alcohol industry self-regulatory codes may not be sufficiently protective of youth. (*J. Stud. Alcohol Drugs*, 75, 615–622, 2014)

ALCOHOL IS THE DRUG MOST FREQUENTLY misused by youth (Eaton et al., 2012; Johnston et al., 2013). Many factors are associated with underage drinking, including alcohol policies, parenting style, parental drinking, peer drinking, and such trait factors as anxiety and depression (Donovan and Molina, 2011). In addition, evidence is growing that exposure to alcohol advertising, marketing, and promotion increases the risk of youth beginning to drink and, if they have already started drinking, the amount they drink (Anderson et al., 2009; Smith and Foxcroft, 2009). Much of this research has been conducted without consideration of the specific brands consumed by underage drinkers, which

potentially diminishes the statistical association between exposure to brand-specific advertising and underage consumption of those brands.

Recently published research has identified the alcoholic beverage brands most frequently consumed by underage drinkers (Siegel et al., 2013). If there is an association between exposure to alcohol advertising for a particular brand and underage consumption of that brand, then we should expect that youth exposure to advertising would be higher for the brands they consume frequently. To test this hypothesis, the present study examined the cross-sectional association between the brands most frequently consumed by youth and underage exposure to magazine alcohol advertising for these brands.

Magazines remain an important part of the advertising portfolio for alcohol producers. Although such advertising has declined in recent years (Center on Alcohol Marketing and Youth, 2007, 2010), the medium continues to offer a highly targeted advertising platform that draws a substantial audience for each ad placement. Youth audiences for some types of publications have more than doubled since 1991 (Stipp, 2013), and youth continue to be exposed at high levels relative to adults on a per capita basis (Center on Alcohol Marketing and Youth, 2010).

In contrast to digital platforms (e.g., the Internet and social media), magazines offer an efficient advertising platform

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with broad reach potential and visual appeal, and therefore advertisers continue to pay a considerable price premium to utilize magazines relative to other media (Stipp, 2013). Alcohol advertisers currently are spending more than \$250 million each year for magazine advertising in the United States.

From a surveillance perspective, magazine advertising exposure data based on licensed media research are available for individual advertisements. This is unlike digital advertising, for which such data are either proprietary to the advertiser or medium or are available only for an entire Internet site rather than for individual advertisements. Thus, magazines still represent an important medium for public health surveillance examining the association between youth exposure to alcohol advertising and underage drinking.

Surveillance reports of underage exposure to alcohol advertising have been published in many prior studies. Before the alcohol industry's adoption of new self-regulatory advertising guidelines in 2003 (Beer Institute, 2011; Distilled Spirits Council of the United States, 2011b; Wine Institute, 2011), youth were seeing more alcohol advertising in magazines, per capita, than adults (Center on Alcohol Marketing and Youth, 2002). Since 2008, compliance with these guidelines has been very high, yet youth continue to see more advertising per capita than adults for the majority of advertisements placed in magazines (Center on Alcohol Marketing and Youth, 2010).

A study by Garfield et al. (2003) found that alcohol advertisers were more likely to place advertisements in magazines with a higher youth audience, after controlling for other factors. However, these results were disputed by Nelson (2006) in a subsequent study that addressed perceived methodological issues with the Garfield et al. study. Neither Garfield et al. nor Nelson (2006) took into account the specific types of alcohol being consumed by underage drinkers. King et al. (2009) improved on these prior studies by showing that alcohol advertisements for the types of alcohol most frequently consumed by youth were more likely to be placed in magazines with higher youth audiences, after controlling for other factors. The next logical step in this line of research is to examine youth exposure to alcohol advertising for the specific brands of alcohol most frequently consumed by underage drinkers, which is the focus of the present study.

The editorial content of magazines may be designed to attract high concentrations of younger female readers (e.g., *Cosmopolitan*), younger men (e.g., *Sports Illustrated*), older women (e.g., *Harpers Bazaar*), or older men (e.g., *Forbes*). Advertisers have an intended audience and will vary their schedule of advertisement placements across different types of magazines to maximize the exposure of that intended audience.

The audience that receives the highest level of exposure for the advertising dollars expended is the one being reached most efficiently. It was for this reason that a California

court, in the *Lockyer v. Reynolds Tobacco Master Settlement Agreement* lawsuit (*The People ex rel. Bill Lockyer v. R.J. Reynolds Tobacco Company*, 2002), concluded that the age groups receiving the highest per capita exposure of tobacco advertising in magazines represented the "target" group for the advertisements. Further, the court concluded that any age group within approximately 10% of this peak exposure level was receiving "effectively the same" exposure and should be considered to be part of the target group. This court ruling presents a valid framework for assessing the effective target age group for alcohol magazine advertising—a group we shall refer to as the "most heavily exposed."

To explore the hypothesis that brand advertising is associated with underage brand consumption, the present study uses U.S. national magazine readership data from 2011. We examined whether underage youth are among the most heavily exposed to magazine advertising for the alcohol brands most popular with youth. We report on age- and sex-specific advertising exposure for the 25 alcohol brands with the highest consumption prevalence separately for underage males and females in early 2012—a total of 30 brands. These 30 brands represent 33% of the total volume of alcohol consumed by underage drinkers in a national study of underage brand consumption (Siegel et al., 2013). We identify the age- and sex-specific groups with the highest per capita advertising exposure for those brands and contrast the findings with the remaining alcohol brands that advertise in magazines.

Method

Data sources

We licensed records from Nielsen Monitor-Plus of all alcohol advertising that appeared in 124 magazines in the United States in 2011 (Nielsen, New York, NY). Our analysis includes only advertisements that appeared in full-run, national editions of magazines and not so-called demographic editions that may be sent to a subset of the subscriber base or only to certain regions of the country. We licensed data from Kantar Media (New York, NY) that specified the type of edition for each advertisement, which we then merged with the Nielsen data. For each advertising placement, Nielsen provided the brand and parent company, the product category, a description of the ad, the publication and its issue date, and the estimated cost. We standardized the alcohol brand names using Impact Databank (M. Shanken Communications, New York, NY), an alcohol industry research firm.

We coded the advertisements as product advertisements, which promoted an alcoholic beverage; responsibility advertisements, which primarily conveyed a prevention message to avoid drinking and driving; corporate advertisement, which offered a public relations message; or sponsorships, which promoted a concert, sporting event, or other event sponsored by the company or one of its specific brands. Ten percent of

the coded advertisements were reviewed by two independent coders to establish interrater reliability, which was high (.94). We included only product advertisements in the analysis reported here.

We matched each product advertisement to magazine readership data we licensed from GfK MRI (Growth from Knowledge, Mediamark Research & Intelligence; New York, NY). The company's Spring 2012 Adult Survey provided data for men and women separately in the following age groups: ages 18–20, 21–24, and 25–29, and each 5-year age group up to ages 50 and older. Audience data for persons ages 12–17 came from the GfK MRI TwelvePlus Fall 2011 Study. The GfK MRI Spring Adult Survey uses a “recent reading” technique to identify readers who have read a given publication within its publishing interval (weekly, monthly, etc.). The TwelvePlus Survey uses a “frequency of reading” technique that identifies how many of the previous four issues of a magazine a reader has read or examined. Although these methodologies are slightly different, it is standard practice in media research to combine these surveys to identify both youth and adult readers (Center on Alcohol Marketing and Youth, 2002).

GfK MRI reported readership data for 80 of the 124 magazines with alcohol advertising that Nielsen monitored in 2011. GfK MRI applies minimum reporting standards for publications measured in its surveys, including a minimum number of respondents and a maximum sampling error, among other factors (GfK Mediamark Research & Intelligence LLC, 2012). The publications included in our analysis had an average readership of 1.3 million or more readers ages 12 and older. The proportion of advertisements for both the top 25 brands popular with youth and the remaining 308 brands that advertised in magazines were the same for these 80 magazines. It was unlikely that selecting only the magazines measured by GfK MRI introduced a bias.

Measures

An advertising “impression” is a single instance of an individual potentially seeing one advertisement as a reader of the magazine in which the advertisement is placed. The sum of multiple advertising impressions is referred to as “gross impressions.” To compare advertising exposure between different groups, advertising gross impressions are scaled to the size of the population for each sex and age group, resulting in a per capita exposure measure called “gross rating points” (GRPs).

Analyses

We conducted a complete census of the magazine advertising appearing in the identified publications, an approach similar to that used in prior public health research (Jernigan et al., 2004) and by the courts in *Lockyer v. Reynolds* (*The*

People ex rel. Bill Lockyer v. R.J. Reynolds Tobacco Company, 2002, 2004). We calculated the total GRPs for each brand that advertised in national magazines in 2011, looking at males and females separately in the following age groups: ages 12–17, 18–20, 21–24, 25–29, plus each 5-year age group up to ages 50 and older. For each brand, we identified the age- and sex-specific group that had the highest per capita exposure and then identified other age- and sex-specific groups whose per capita exposure was within 10% of the highest value. We reported the age group receiving the highest level of exposure, as well as the youngest age group within 10% of this peak exposure group, whenever the youngest age group and highest exposed age group were not identical. The *Lockyer v. Reynolds* court opinion found that an underage group with GRPs within 11.4% of an adult group suggested that exposure for the two groups was “effectively the same” (*The People ex rel. Bill Lockyer v. R.J. Reynolds Tobacco Company*, 2002). We used a 10% cutoff as a more conservative estimate.

Because the U.S. minimum legal drinking age is 21, the alcohol industry's self-regulatory advertising codes call for advertisers to minimize exposure to underage readers, including those ages 18–20 (Beer Institute, 2011; Distilled Spirits Council of the United States, 2011a, 2011b; Wine Institute, 2011). Accordingly, we identified the percentage of alcohol brands with readers ages 18–20 as their most heavily exposed group, as well as the percentage of brands that exposed readers ages 18–20 to effectively the same level of advertising as the highest exposure group (i.e., within 10% of the peak age group). We contrasted the top 25 brands for males, the top 25 brands for females, and all other brands.

Last, we classified all publications into the following categories based on the age- and sex-specific profiles of their readership: (a) young adult/male, (b) young adult/female, (c) young adult/dual (with similar exposure for males and females), and (d) all other publications. We classified publications with a ratio of male/female GRPs less than 0.90 as “female,” a ratio of 0.90 to 1.10 as “dual,” and a ratio greater than 1.10 as “male.” We classified a publication as “young adult” if its highest per capita readership (based on GRPs) was below age 25; we classified the remaining publication as “other.” To discern the sex- and age-specific audiences that advertisers may have been attempting to target, we compared reported expenditures across these four groups.

Results

Males

Seventeen of the top 25 brands (68%) consumed by underage males included 18- to 20-year-olds in the group most heavily exposed to their advertising (Table 1). Eleven brands (44%) generated more advertising exposure for males ages 18–20 than for any other age group, whereas 6 brands (24%)

TABLE 1. Magazine advertising exposure for the top 25 brands consumed by underage males, 2011

Brand	Advertising exposure by age range (gross rating points): Males								
	12–17	18–20	21–24	25–29	30–34	35–39	40–44	45–49	≥50
Bud Light Beer	196	454 ^a	364	324	277	241	194	178	101
Budweiser Beer	87	201 ^a	175	142	139	121	98	102	52
Smirnoff Vodka	38	91 ^a	42	46	56	68	38	31	13
Coors Light Beer	107	242 ^a	171	131	134	129	108	133	90
Jack Daniels Whiskey	3	57	95	103	103	111 ^a	93	86	92
Captain Morgan Rums	3	8	13	15 ^a	12	9	7	5	2
Absolut Vodka	260	655 ^a	622	576	564	486	380	344	198
Heineken Beer	181	441 ^a	410	354	360	321	253	264	149
Bacardi Rums	21	50 ^b	51 ^a	37	45	37	33	32	16
Bacardi Malt Beverages	27	80 ^a	45	67	72	61	39	28	15
Jose Cuervo Tequila	1	5 ^c	1	1	4	5 ^a	2	2	1
Miller Lite Beer	111	235 ^a	198	175	150	135	105	111	60
Grey Goose Vodka	7	56	63	77 ^a	75	67	44	48	35
Malibu Rum	16	41	49 ^a	46	44	33	28	22	10
Hennessy Cognacs	119	254 ^a	233	225	190	166	113	119	59
Patron Tequila	251	668 ^b	669 ^a	643	614	606	508	500	340
Bailey's Irish Cream Liqueur	0	1	4	2	3	5	7 ^a	6	6
UV Vodka	26	72 ^b	50	51	73 ^a	49	34	25	8
1800 Tequila	0	4	9	7	9	11	13 ^a	13	10
Jim Beam Bourbon	65	244 ^b	255 ^a	234	239	193	174	134	79
Skyy Vodka	224	534 ^a	532	486	449	390	299	273	129
Crown Royal Whiskey	17	66 ^b	59	61	64	64	67 ^a	60	49
Budweiser Select Beer	25	90 ^b	100 ^a	94	84	95	69	72	36
Modelo Beer	35	81 ^a	57	43	45	44	37	46	32
Amstel Light Beer	13	46	68 ^a	64	58	62	53	47	26

Notes: Brands are sorted by the prevalence of consumption among underage drinkers. ^aThe maximum exposure age group; ^bunderage group within 10% of the maximum exposure age group; ^cfor Jose Cuervo, age 18–20 exposure was 4.72, which was less than 10% of the peak level of 5.28.

exposed males ages 18–20 to effectively the same level of advertising as the most heavily exposed adult group.

Eight brands appear to exhibit a possible “spillover” effect, as exposure levels for 18- to 20-year-olds were comparable to those for 21- to 24-year-olds. Brands in Table 1 that exhibit a spillover pattern of exposure include four for which ages 18–20 are within 10% of the peak age 21–24 exposure (Bacardi Rums, Patron Tequila, Jim Beam Bourbon, and Budweiser Select Beer) and another four for which ages 21–24 are within 10% of the peak age 18–20 exposure (Absolut Vodka, Heineken Beer, Hennessy Cognac, and Skyy Vodka). Note that spillover is not an adequate explanation for the pattern of exposure levels for such brands as Bud Light Beer, Budweiser Beer, Smirnoff Vodka, Coors Light Beer, Bacardi Malt Beverages, Miller Lite Beer, or Modelo Beer because each of these brands exposed 18- to 20-year-olds at levels substantially higher than those for 21- to 24-year-olds.

Among the other 308 magazine advertising brands not consumed as frequently by underage males, only 7.5% had males ages 18–20 among their most heavily exposed age group. These 308 brands included high-volume magazine advertising brands (e.g., Wild Turkey Bourbon, Maker's Mark Bourbon, and Pinnacle Vodka) that did expose ages 18–20 to the most advertising, as well as similarly high-volume magazine advertising brands (e.g., Glenlivet Scotch Whiskey, Stella Artois Beer, and Michelob Ultra Beer) that

maximized exposure to ages 25–29, 30–34, and 35–39, respectively. Overall, the top 25 brands consumed by underage males were 9.1 times more likely to include underage males ages 18–20 in their most heavily exposed group compared with the other 308 brands (prevalence ratio = 9.1, 95% CI [5.7, 14.7]).

Females

Eighteen of the top 25 brands (72%) consumed by underage females included 18- to 20-year-olds in the group most heavily exposed to their advertising (Table 2). Sixteen brands (64%) generated more advertising exposure for females ages 18–20 than any other age group, whereas 2 brands (8%) exposed females ages 18–20 to effectively the same level of advertising as the most heavily exposed adult group.

Only 6 of the 18 brands exhibited a spillover pattern of exposure; these were Budweiser Beer, Bacardi Rums, Miller Lite Beer, Malibu Rum, Patron Tequila, and Kahlua Liqueur. Miller Lite Beer was unusual in that 18- to 20-year-olds saw exposure comparable to that of 25- to 29-year-olds. The remaining 12 brands exposed females ages 18–20 to substantially more advertising than any other age group, a finding that could not be considered incidental exposure spilling over from the adjacent age group of 21- to 24-year-olds.

Among the other 308 alcohol brands not in the top 25 for underage females, only 13% had females ages 18–20 among

TABLE 2. Magazine advertising exposure for the top 25 brands consumed by underage females, 2011

Brand	Advertising exposure by age range (gross rating points): Females								
	12–17	18–20	21–24	25–29	30–34	35–39	40–44	45–49	≥50
Bud Light Beer	48	130 ^a	80	83	103	76	56	61	23
Budweiser Beer	36	53 ^a	48	52	50	40	34	36	16
Smirnoff Vodka	135	276 ^a	168	220	143	152	119	74	41
Coors Light Beer	20	32	32	35	31	20	34	41 ^a	23
Jack Daniels Whiskey	12	25	19	33 ^a	20	24	31	30	22
Captain Morgan Rums	1	3	3	5 ^a	3	3	1	1	0
Absolut Vodka	276	587 ^a	453	456	406	357	325	305	151
Heineken Beer	99	154 ^a	136	145	138	112	116	104	54
Bacardi Rums	23	35 ^a	34	25	24	23	19	17	8
Bacardi Malt Beverages	169	381 ^a	299	350	280	237	192	161	61
Jose Cuervo Tequila	4	13 ^a	7	9	7	8	8	5	3
Miller Lite Beer	21	45 ^b	34	45 ^a	44	28	28	32	14
Grey Goose Vodka	64	120 ^a	81	99	80	69	77	84	42
Malibu Rum	13	24 ^a	21	20	18	16	11	9	4
Patron Tequila	246	537 ^a	533	536	475	445	435	427	251
Bailey's Irish Cream Liqueur	0	0	3	8 ^a	6	5	6	5	4
UV Vodka	119	196	169	260 ^a	213	168	131	116	35
1800 Tequila	0	0	6	10 ^a	7	6	7	9	5
Jim Beam Bourbon	40	100 ^a	74	69	70	74	46	44	18
Skyy Vodka	243	618 ^a	542	470	403	345	309	272	112
Seagrams Malt Beverages	220	429 ^a	348	291	282	277	323	294	214
Jose Cuervo Margaritas	48	144 ^a	72	104	72	90	83	56	38
Pinnacle Vodka	96	326 ^a	284	232	194	170	152	144	62
Kahlua Liqueur	102	255 ^b	263 ^a	250	248	238	261	224	154
Yellow Tail Wines	0	0	1	2 ^a	1	1	1	1	1

Notes: Brands are sorted by the prevalence of consumption among underage drinkers. ^aThe maximum exposure age group; ^bunderage group within 10% of the maximum exposure age group.

the most heavily exposed age group. Thus, the top 25 brands consumed by underage females were 5.5 times more likely to include underage females ages 18–20 in their most heavily exposed group compared with the other 308 alcohol brands advertising in magazines (prevalence ratio = 5.5, 95% CI [3.8, 8.1]).

Brand advertising spending by publication profile

We found large differences in brand advertising spending across different types of publications (Table 3). Almost a quarter (23%) of magazine advertising expenditures for the 25 brands most popular with underage females were spent on advertisements in publications with a predominantly young-adult/female readership. By contrast, only 14% of expenditures for all other brands were used to place advertisements in these publications. Similarly, 41% of magazine expenditures for the 25 brands most popular with underage males were spent on ads in publications with a predominantly young-adult/male readership versus only 21% of expenditures for all other brands.

Discussion

To the best of our knowledge, this is the first study to examine the exposure of youth and adults to magazine advertising for the alcohol brands most frequently consumed

by underage drinkers. We found that the brands most frequently consumed by minors typically have the highest levels of magazine advertising exposure among underage readers ages 18–20. Compared with other magazine advertising brands, the top 25 brands for underage females and the top 25 brands for underage males were more likely to spend a greater proportion of their national magazine advertising dollars in publications with higher concentrations of younger readers. As a result, these popular brands were 5.5–9.1 times more likely to have underage readers ages 18–20 in the group most heavily exposed to their advertising compared

TABLE 3. Top 25 underage brands' magazine advertising expenditures^a by publication age- and sex-demographic profile^b, 2011

Publication profile	% of expenditures by publication profile			
	Female		Male	
	Top 25 brands	All other magazine brands	Top 25 brands	All other magazine brands
Young adult/female	23%	14%	17%	18%
Young adult/male	37%	22%	41%	21%
Young adult/dual	1%	1%	1%	1%
All other publications	38%	62%	41%	60%
Total	100%	100%	100%	100%

Note: Young adult/dual publications have roughly equal male and female readership. ^aAdvertising expenditures are rate book estimates provided by Nielsen Monitor-Plus (New York, NY); ^ba magazine's publication profile is defined by its dominant readership group.

with the other 308 alcohol brands advertising in magazines. The fact that this pattern was not found for the brands less popular with youth suggests that advertisers can control which age group has the greatest exposure by modifying the proportion of advertising dollars allocated to different publication types.

The high levels of brand-specific advertising exposure among underage drinkers ages 18–20 suggests that alcohol advertising may be targeted to this underage group, at least according to a standard established by the courts in *Lockyer v. Reynolds* for tobacco magazine advertising (*The People ex rel. Bill Lockyer v. R.J. Reynolds Tobacco Company*, 2002, 2004). Most of the alcohol brands that would be considered targeting youth ages 18–20 with magazine advertising (by standards of *Lockyer v. Reynolds*) were also those most commonly consumed by underage drinkers. These research findings are consistent with a hypothesized association between advertising exposure and drinking behavior; however, future research using individual drinking behaviors and advertising exposure measures is needed to completely assess this hypothesis.

It is unlikely that the advertising exposure among 18- to 20-year-olds was the result of spillover advertising resulting from efforts to target legal-age adults ages 21–24. First, the majority of brands popular with underage drinkers showed peak advertising levels for ages 18–20, with the advertising levels for ages 21–24 well below those peaks. A spillover effect would show the opposite pattern, with those ages 21–24 having the highest exposure levels and those ages 18–20 falling close behind. We did find such patterns in our analysis, but only for a minority of brands.

Second, in the *Lockyer v. Reynolds* case, media researchers presented expert testimony showing that alternative magazine advertising schedules could be created that would achieve high levels of exposure for adults while reducing youth exposure. The court asserted that “it was or should have been apparent to the people managing Reynolds’s multimillion dollar sophisticated print advertising campaign that its tobacco advertising was exposed to youth at levels substantially similar to targeted adult smokers” (*The People ex rel. Bill Lockyer v. R.J. Reynolds Tobacco Company*, 2004). Thus, the court rejected spillover as an explanation for the high levels of youth exposure.

We should note that the pool of magazines with an audience large enough to be of interest to national advertisers is shrinking. As a result, if an advertiser wants to place advertising in a measured national sports magazine, for example, the choices are limited to *Sports Illustrated* or *ESPN The Magazine*. Unfortunately, both of these magazines also have a disproportionately high percentage of underage males among their readership (15.9% and 20.8%, respectively). We acknowledge the challenges facing alcohol producers who wish to advertise their brands in sports magazines, popular culture magazines, or fashion magazines, many of which

have relatively young audiences. Regardless, all parties agree that disproportionate underage exposure to alcohol advertising is undesirable (Beer Institute, 2011; Distilled Spirits Council of the United States, 2011b; Wine Institute, 2011). Therefore, the burden must rest with alcohol advertisers to do what is necessary to eliminate or reduce advertising in magazines that expose underage readers ages 18–20 to the same or greater levels of per capita advertising as for adults of legal age.

It is clear from our analysis that there are two approaches being taken by advertisers. Some brands are setting a target at ages 25 and older and scheduling advertising levels for this age group high enough to generate adequate coverage for young adults ages 21–24. For example, the majority (67%) of the 308 advertising brands that are less popular with underage drinkers exposed ages 25–29 to the highest levels of advertising. By contrast, the approach used by the majority of brands most popular with underage drinkers is to expose ages 18–20 to the highest levels of advertising.

Our results raise questions about the efficacy of the alcohol industry’s current self-regulatory advertising guidelines. We noted that 100% of the advertisements in our study were placed in publications with an underage audience less than 30% of the total audience, thereby complying with the advertising placement guidelines for all three alcohol trade associations (Beer Institute, 2011; Distilled Spirits Council of the United States, 2011b; Wine Institute, 2011). This analysis clearly shows how alcohol companies can generate high levels of exposure to magazine advertising for underage readers even while complying with these self-regulatory guidelines. This is possible because alcohol companies can concentrate the exposure among any underage subgroup as long as it does not exceed 30% of the total exposure (Jernigan et al., 2005). The National Research Council/Institute of Medicine and 24 state and territorial attorneys general have recommended an underage composition limit of 15% of the total audience (Bonnie and O’Connell, 2004; Shurtleff et al., 2011), proportionate to the at-risk population of underage drinkers ages 12–20—a limit that would make it more difficult to generate high levels of exposure among underage drinkers. This study makes clear why this more restrictive standard is needed.

Our findings are cross-sectional and do not speak to the temporal association between advertising exposure and drinking behavior. It is possible that magazine advertising exposure to ads for these brands is influencing youth consumption of these brands. It may also be possible that other factors are causing youth to consume these brands and that advertisers are simply placing ads in magazines in which their consumers are prevalent in the audience. Thus, further research may be required to examine the temporal association between brand-specific advertising exposure and brand-specific alcohol consumption.

A prior study examined magazine advertising placements as a function of readership age but without consideration of the specific brands being advertised. The author concluded that advertising placements were not associated with youth audience composition (Nelson, 2006). A later study improved on this methodology by considering the type of alcohol being advertised, finding an association between the youthfulness of a magazine's readership and alcohol advertising placements for alcohol types popular with youth (King et al., 2009). The present study represents a further refinement of this line of research by considering the specific brands being consumed by youth and using a simple descriptive methodology to examine the actual exposure of youth and adults to individual brand advertising. Future research may build on this study by developing more sophisticated models to control for advertising pricing, frequency of publication, editorial focus, and other predictive factors.

This study is limited by its focus on magazine advertising. Magazines present alcohol advertisers with a highly targeted platform, but magazines are only one of many media advertisers can use for promoting their products. It is possible, then, that advertisers who place advertisements in magazines with sizeable youth audiences are using other media with older audiences to balance out exposure to their advertising across age groups. This seems unlikely, however, because it would be more cost-efficient to place all magazine advertisements in publications with older audiences rather than to develop additional advertising executions for those other media to offset the underage exposure in magazines.

These results are subject to additional limitations. First, we used readership data that were contemporaneous with the publication dates of the magazines, but because alcohol producers must purchase advertisements in advance of publication, it is conceivable that the readership of some magazines may have changed by the time an advertisement was published. This is a remote possibility, however, as the magazines' readership is relatively stable from year to year (Center on Alcohol Marketing and Youth, 2007, 2010).

Second, our findings are cross-sectional, and we cannot assess the temporal association between the advertising exposure and the drinking behavior. It is possible that magazine advertising exposure to ads for these brands is influencing youth consumption of these brands. It may also be possible that other factors are causing youth to consume these brands, or that by chance advertisers are placing ads in magazines where their consumers are prevalent. Thus, further research may be required to examine the temporal association between brand-specific advertising exposure and brand-specific alcohol consumption.

Third, it may be that alcohol marketers seek to advertise in magazines with certain characteristics, other than readership sex or age, that we did not control for in this analysis (i.e., editorial focus, total readership, production quality, or price). However, we contrasted the advertising for brands

most popular with youth with all other brands advertising in many of these same magazines, providing some level of control for these other factors. Regardless, the fact remains that it was the mix of magazines in which advertisements were being placed that appeared to generate higher levels of underage exposure.

Last, not all magazines in which alcohol ads appear have a measured audience, and therefore youth and adult exposure to these advertisements are not included in this analysis. For example, although we excluded demographic editions of magazines from our analysis, there is "pass-along" exposure to youth from these advertisements that may be substantial (Ostroff and Jernigan, 2007). Thus, the results of this study should be interpreted only in the context of advertising in full-run editions of measured magazines.

Youth ages 18–20 are among the age group with the highest prevalence of heavy episodic drinking and alcohol use disorders (Dawson et al., 2004; Knight et al., 2002; Nelson et al., 2009; Weitzman et al., 2003), based on criteria from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (American Psychiatric Association, 1994). There is mounting evidence that exposure to alcohol advertising contributes to both drinking and drinking-related harms (Grenard et al., 2013; Morgenstern et al., 2011). Although this study did not examine specific drinking behaviors, we did find a correlation between youth drinking of certain brands and high levels of magazine advertising exposure for those same brands—an association supportive of our hypothesis. In that context, we have found that the majority of brands most popular with minors expose underage magazine readers to the same as or higher levels of alcohol advertising than adults of legal age. This finding suggests that current alcohol industry self-regulatory standards are ineffective in shielding this segment of the underage population from exposure to alcohol advertising.

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